SOCIETY OF ARTS.

FRIDAY, JULY 22nd, 1853.

MEETING OF COUNCIL.

Wednesday, July 20th, 1853.

THE Council this day further considered the subject of Lectures for Institutions, and having carefully weighed the results of the experience of the Institutes' Committee on this subject, together with the proceedings of the late Conference under this head, and the communications which had been received from the Institutions, and from Lecturers and others, it was

"RESOLVED—That the Institutions do not appear at present to be generally in a position to afford to the Council the requisite facilities for bringing into immediate operation any extensive and complete scheme for systematically supplying the Institutions with Lecturers. That it be recommended to the Institutions to endeavour, with the aid of this Society, to form themselves, as far as possible, into local unions and sub-unions, with reference to Lectures. That when in any district a sufficient number of Institutions in Union with this Society shall be so grouped as to require among them on at least four successive nights in each of four successive weeks a lecture on the same subject, at a remuneration of not less than three and a half guineas each lecture, including all ordinary expenses, the Council will make arrangements to furnish competent Lecturers to such Institutions."

It is particularly requested that the Secretary may be kept fully informed, from time to time, of any steps which Institutions may take to form Lecture Unions. In the meantime he will be happy to afford such assistance as may be in his power with reference to the subjects of Lectures, the names of Lecturers, &c.

The following Institutions have been taken into Union since the last announcement:

281. Shaftesbury, Literary Institution.
282. West Hartlepool, Literary and Mechanics' Institution.
283. York, Institute of Popular Science and Literature.

NOTICE TO INSTITUTIONS.

THE Council have much gratification in announcing that, pending their negotiations with the publishers, they have received a communication from the Representative of the late Colonel Gurwood, offering to the Institutions in Union copies of the well-known "Despatches of the Duke of Wellington," published at eight guineas, in eight volumes, royal octavo, bound in cloth, for four guineas. The Council wish particularly to call attention to this favourable opportunity of obtaining on very liberal terms a work which, they presume to say, should be found in every public library. They will receive orders for the work, which should be accompanied by a Post-office order for four guineas, and will arrange for its prompt transmission.

SALT—THE SOURCES FROM WHENCE IT IS OBTAINED, AND THE PROCESSES INVOLVED IN ITS MANUFACTURE.

BY H. OWEN HUSKISSON.

SALT is one of the most abundant productions of nature, and is found in almost every country in the world. It is found in both kingdoms of nature, the organised and the inorganised. The geological position of rock salt is between the coal formation and the lias; and its thickness varies from one or two inches to twelve or fifteen yards. It is not deposited in regular strata, but rather in lenticular masses of variable extent. Salt springs occur in nearly the same circumstances as the rock salt, but the inland seas, salt lakes, and salt marshes, obviously have their several localities independent of geological formation. On an average, they yield four ounces of salt from a pound of brine. But the most magnificent mine of salt is the ocean, which contains about 2·5 per cent., or one fortieth of its weight.

Salt is prepared in various ways. Most of the salt consumed in this country is procured by evaporation of the water of brine springs. The salt districts are—Northwich, Nantwich, and Middlewich, in Cheshire; Droitwich, in Worcestershire; and Shirleywich, in Staffordshire. At Northwich there are mines as well as springs, the rock being for the most part of a reddish colour; but it is also met with in transparent colourless masses, which is the "sal gem" of old pharmacy. It is called in commerce "Prussian rock," and is largely used for exportation; it is obtained from the mines by blasting with gunpowder. In Poland, and some other places, rock salt is broken into fragments fit for the mills, where it is reduced into a coarse farina, and then serves all the uses of culinary salt.

When obtained from brine springs, the brine is pumped up from springs, which are from twenty to forty yards in depth, by water power, or, in case of failure from that source, by steam-engines, into large reservoirs near the "saltern" or "boiling house," dug out of the earth, and puddled on the inside with clay, where it remains exposed to the air until wanted. It is then drawn off into large oblong, wrought-iron evaporating pans, which are generally from twenty to thirty feet in length, and about the same in breadth, and nine or twelve inches deep; these pans are strongly set upon masonry, over a large furnace of four or more fires, so constructed that the heat plays under every part of the pan. The waste heat is afterwards sent, by means of the flue, to heat the rooms in which the salt is dried. The pans are protected from the weather by light pyramidal roofs of boards, sufficiently open to allow of the escape of the steam from the boiling brine. If the brine be not sufficiently saturated with salt, a little rock salt is sometimes added. When the brine attains the temperature of 100° Fahrenheit it grows turbid, and carbonate of lime and iron, which were previously held in solution by carbonic acid, are deposited. These are partly removed by a skimming dish, but much of the mass falls to the bottom, and cannot be removed until the first deposition of crystallized salt gives it a sufficient body to enable the workmen to rake it out. These two operations are called "clearing the pan." Some brines scarcely require them at all, and others only occasionally. There is also deposited a solid incrustation at the bottom of the pan (which adheres so strongly that it cannot be removed by raking) called "pan scratch," "pan scale," or "pan bake," and is forcibly taken away with a pickaxe every three or four weeks. After this is carefully done, the evaporation is continued at a boiling heat, when the salt gradually forms, and falls to the bottom of the pan in delicate white crystals, which are

fished out as they collect with wooden vessels, and poured into large hollow wooden cones, having a hole at the apex. When the salt is sufficiently drained, the cones filled with it are taken to a large room, where they remain until thoroughly dry. That intended for home consumption is cast into pyramids or hoppers; that for exportation into cones, as this form is most easily broken, it being sent abroad in sacks. The grains or crystals of salt vary in size according to the degree of heat employed in their preparation; the greater the heat, the smaller the crystal.

In making the "stoved," "lump," or "basket salt" of commerce, the brine is brought to a boiling heat, which, in brine fully saturated, is 226° Fahrenheit. This temperature is continued during the whole of the process. At the end of ten or twelve hours the greater part of the water of solution is found to be evaporated, so much only being left as barely to cover the bottom of the pan. The salt is then removed into conical wicker baskets, termed "barrows;" and after being well drained, is dried in stoves, where it sustains a loss of about one-seventh part of its weight.

In the preparation of "common salt," the brine is first raised to a boiling heat, with the double purpose of bringing it as quickly as possible to the point of saturation, and of clearing it of its earthy contents; the fires are then slackened, and the evaporation carried on for twenty-four hours, with the brine heated to 160° or 170° Fahrenheit: after being drained it is carried to the storeroom, and not heated as the "stoved salt." In "large grained" or "flaky" salt, the brine is evaporated at 130° or 140° Fahrenheit, by which means it is harder, larger, and has more of the cubic shape of chloride of sodium. In "large grained" or "fishery" salt, the brine is evaporated at 100° or 110° Fahrenheit, and, by the slowness of the process, eight or ten days are necessary to complete a charge, the crystals of which are nearly cubical and perfect.

Where the salt is much mixed with the ingredients of the rock or soil, the process termed "lixiviation" is adopted. This consists in dissolving the salt with water, and so getting rid of the earthy impurities, when the brine is treated as usual. This method is followed in salty incrustations by the sides of seas or lakes, and upon some of the African plains, where the salt is not thick enough to be separated in flakes. Also in rocks which are imbued with salt, as that of the saline rock of Arbonne, in Savoy, which is a mass of saccharoid and anhydrous gypsum, saturated with common salt; after the salt is extracted, the gypsum is porous and light. The white sea salt of Normandy is prepared by gathering the muddy sand on the flats of the shore, which the rising tide has covered and impregnated with its waters for seven or eight days. The sand being removed into pits made for the purpose, discharges itself, by degrees, of all its water, which filtrates through straw with which the bottom of the pit is filled, and trickles into vessels set to receive it. Of this water they make their salt. This process is also adopted on the coast of China.

The extraction of chloride of sodium from sea water by fuel alone would be so costly as to exclude many maritime countries from preparing it. It has therefore led to many processes for obtaining it without artificial heat, or with the least amount that can effect the evaporation, advantage being taken of solar heat, surface evaporation, congelation, &c.

The process adopted in warm countries is solar or natural evaporation, under the form of "saline tanks," "brine reservoirs," or "salt marshes," called also "brine pits." The French salt marshes are large shallow basins or pans, excavated along the sea-shore; they are formed of clay, and the bottoms are very smooth. The water is admitted from the sea into a reservoir by means of a sluice; this reservoir is deeper than the proper brine pits, and is filled at high water, though the tides are rather inconvenient than otherwise. The sea is let into this reservoir in the month of March, where, while it is exposed, surface evaporation goes on to a great extent, and mechanical impurities subside. It then passes by a subterranean passage into a series of brine pits, properly so called, divided by means of little banks; channels of communication are pierced through these banks from one pit to another, so contrived that the brine has a very circuitous route, sometimes passing through three sets, and flowing 400 or 500 yards before it reaches the extremity. The various divisions have each a name, by which they are technically distinguished. During the whole of this time the brine has been undergoing evaporation; and when it arrives at the last division, it is so far concentrated that crystallization is soon effected. Sometimes the salt is allowed to subside in the first compartment, but the brine is generally supplied from the first reservoir as the water in the compartments evaporate. The salt is known to be on the point of crystallizing when the liquid assumes a reddish tint. Soon after this a pellicle forms on the surface, which breaks and falls to the bottom. It is then withdrawn from the pans, and collected upon the borders in conical or pyramidical heaps, called "camelles," where it drains and dries. The salt thus obtained is called "bay salt," and partakes of the colour of the bottom upon which it is formed, and is hence called white, red, or grey. The marshes should be exposed to the N.N.E. or N.W. winds. The operations begin in March and finish in September.

At Lymington, in Hampshire, salt is prepared from sea water by a combination of the natural and artificial systems. The salt water is admitted into a reservoir or pond, and from this successively into three series of brine pits or salt pans, where the water is partly evaporated by solar heat. When the liquid has acquired a sufficient density, it is conveyed into rectangular iron pans, where it is evaporated by artificial heat. Eight hours are required to boil each charge to dryness. The salt is then removed into wooden troughs or cisterns perforated with holes in the bottom, where it is allowed to drain, and is afterwards removed to the warehouse, where it dries. The drainings from the wooden troughs drop on upright stakes (old broom handles, &c.), where, in the course of ten or twelve days, it concretes in large stalactitic masses, each weighing sixty or eighty pounds called "salt cats." The residual liquor (bittern, bitter, or bittern liquor) is received in underground pits, and during the winter season, when it is too cold for making salt, is used for the manufacture of Epsom salts (sulphate of magnesia). The salt cats bear the proportion to the common salt made from the same brine of 1 to 100. The specific gravity of the brine is ascertained by glass bulbs (on the principle of Lovi's beads) placed in a wicker basket, which is immersed in the liquid by means of a long handle.

Surface evaporation by graduating houses is extensively practised in France and Germany. The weak brine is pumped up into an immense cistern on the top of a tower, and is there allowed to fall down upon heaps of brushwood, thorns, &c., built up in regular walls between parallel wooden frames; by which it is agitated and divided by the air and evaporation promoted. At Salza, near Schonebeck, the graduation house is 5,817 feet long, the thorn walls are from 33 to 52 feet high in different parts, and present a total surface

of 25,000 square feet. Under the thorns, a great brine cistern, made of strong wooden planks, is placed to receive the perpetual shower of water. Upon the ridge of the graduation house there is a long spout, perforated on each side with numerous holes, and furnished with stop-cocks or spigots, for distributing the brine either over the surface of the thorns or down through the mass —the latter method affording larger evaporation. The graduation house should be built lengthwise in the direction of the prevailing wind, with its ends open. An experience of many years at Salza and Durrenburg has shown that, in the former place, graduation can go on 258 days, and in the latter 207 days in the year, on an average; the best season being from May till August. At Durrenburg, 3,596,561 cubic feet of water are evaporated annually. According to the weakness of the brine it must be more frequently pumped up, and made to flow down on the thorns in different compartments of the building, called the first, second, and third graduation. A deposit of gypsum incrusts the twigs, which requires them to be renewed at the end of a certain time. The brine, which contains at first 7·962 per cent. of salt, indicates after the first shower, 11·473; after the second, 16·108; and after the third, 22. The brine, when concentrated to such a degree as to be fit for boiling, is kept in great reservoirs, of which the eight at Salza have a capacity of 2,421,720 cubic feet, and are furnished with pipes leading to the sheet iron salt-pans. The capacity of these salt-pans is various. At Shoenbeck there are twenty; the smallest having a capacity of 400 feet, the largest of 1,250 feet. They are inclosed within walls to prevent them being affected by the cold external air, and they are covered with a funnel-formed or pyramidal trunk of deals, ending in a square chimney to carry off the steam. In the construction of the salt-pans, the fire-grate is made to slope upwards to the back part, and is 31½ inches distant from the bottom of the pan. The ratio of the surface of the grate is as 1 to 59·5; that of the air-hole into the ash-pit as 1 to 306. The bed under the pan is laid with bricks, smoothly plastered over; and upon this, pillars are built in a radiated direction, six inches broad at the bottom, and tapering to an inch and a half at the top. The pan is so laid that its bottom has a fall towards the middle of two inches and a half. The fire diffuses itself in all directions under the pan, and proceeds through several holes into flues which run along three sides of the pan. The heated air is then passed under other pans, from which it is collected in chimnies, to be conducted to the drying-room. On the sides of the pans rows of boards are placed, slightly inclined, upon which the boiled salt is placed to drain. When it is drained sufficiently, it is put into small baskets, and carried to the store-room, which should be kept at a temperature of from 120° to 130° Fahrenheit. Upon both sides of the hot flues in the store-room hurdle-frames are placed, each of which contains eleven baskets; and every basket, except the undermost, holds 60 lbs. of salt, spread in a layer two inches thick. In proportion as the salt becomes concentrated by evaporation, brine is added from the settling reservoir of the graduation house, till finally small crystals appear on the surface, when the charge is worked off, care being taken to remove the scum as it appears. In some places the first pan is called a "schlot" pan, in which the concentration is carried only so far as to cause the deposition of the "sludge," from which the saline solution is run into another pan, and gently evaporated, to produce the precipitation of fine salt. In the "schlotting" or "throwing down" of the sediment, bullocks' blood, or eggs previously beaten up with some cold brine, are occasionally added to promote the clarification. When the brine acquires, by quick ebullition, the density of 1·200, it should be run off from the precipitating to the finishing or salting-pans. The boilers at Rosenheim, in Bavaria, evaporate 3½ lbs. of water for every lb. of wood consumed, which is considered a favourable result. The salt should be continually raked towards the cooler and more elevated sides of the pan, and then lifted out with colander shovels into large conical baskets, arranged in wooden frames round the borders of the pan, so that the drainings may flow back into the boiling brine. The graduation plan could not be carried on in this country without the aid of warm currents of air, artificially produced. In summer, saturated boiling brine is crystallized by passing it over vertical ropes; for which purpose 100,000 metres (110,000 yards) are mounted in an apartment 70 metres (77 yards) long. When the salt has formed a crust upon the ropes about 2½ inches thick, it is broken off, allowed to fall upon the clean floor, and then gathered up. The salting of a charge which would take five or six days in the pan is completed in this way in seventeen hours; but the mother waters are more abundant; this, however, is fully compensated by the salt being singularly pure.

In Sweden and some other cold countries, congelation is resorted to as a means of concentrating sea-water; for when a weak saline solution is exposed to great cold, it separates into two parts—one almost pure water, which freezes; and the other, which remains liquid, and contains the larger proportion of salt.

In those places where fuel is abundant, salt is extracted from sea water entirely by artificial heat. On the eastern and western coasts of Scotland, especially on the shores of the Firth of Forth, large quantities of salt are made by the evaporation of sea water. In consequence of the cheapness of fuel, the process is carried on, from first to last, at a temperature equal, or nearly so, to the boiling point; and varies therefore according to the concentration of the brine. The salt approximates in character to the "stoved." A salt is also prepared, called "Sunday salt,"—so named in consequence of the fires being slackened from Saturday to Monday, which much increases the size of the crystal. On the banks of the Mersey, near its junction with the Irish Channel, the water of that river, before evaporation, is brought to the state of saturated brine by the addition of rock salt. The benefit derived from this proceeding will be obvious, when it is stated that 100 tons of this brine yield at least 23 tons of common salt; whereas, from the same quantity of sea water, with an equal expenditure of fuel, only 2 tons 17 cwt. can be produced.

Chloride of sodium, as obtained from its natural solutions by evaporation and crystallization, or as rock salt, is always more or less mixed with saline, earthy, and other impurities; which render it necessary to be purified before it can be applied to economical or scientific purposes.

Of rock salt there are two varieties; the one, white and transparent, the other, of a reddish-brown. The former has been found to be almost pure chloride of sodium; the latter is contaminated with a marly earth, containing a small portion of carbonate of iron, to which it owes its colour, and sulphate of lime. These are partially removed by boiling and skimming; by boiling the brine you expel the carbonic acid, which holds the carbonate of lime in solution, and converts the carbonate of iron into an oxide; both of which are insoluble, and would be precipitated. Any earthy muriates can be precipitated by carbonate of soda, filtering

and neutralizing the excess of soda, if any, with hydrochloric acid.

The waters of the ocean, from different parts of the globe, always contain the same ingredients. The variation in the relative quantities of the ingredients is, at the most, small, and arises from the nature of the beds of the ocean, from the dilution of the sea water by the flowing of rivers into it, by the rain, and through the ice masses of the Polar regions. According to Forcammer, the part of the ocean most rich in salts is the Mediterranean sea, in the vicinity of the island of Malta, which contains 37·177 thousandths of solid matter, in which 20·046 thousandths are chlorine. He also found the saline contents sensibly diminish towards the coast, even of the smallest islands. Dr. Ure states that the largest proportion of salt, held in solution in the open sea, is 38 parts in 1,000, and the smallest, 32. It contains the most saline matter in warm climates, and at the greatest depths. Mulder gives as the mean of a great number of analyses performed in his laboratory, the annexed:

Chloride of Sodium	78·5
,, Magnesium	9·4
Sulphate of Magnesia	6·4
,, Lime	4·4
Chloride of Potassium	1·0
Bromide of Magnesium	0·17
Carbonate of Lime	0·04
Silicic Acid	0·009
Ammonia	0·13

The great resemblance in the composition of various sea waters is shown by the specific gravity of the different kinds. Twenty-eight specimens, collected on a journey from Java to Holland, in different degrees of latitude and longitude, gave a density at 54° Fahrenheit for the highest of 1·02891, and for the lowest 1·02711. The average specific gravity ranges from 1·029 to 1·030. It freezes at about 28·5° Fahrenheit. The waters of the Mediterranean contain a little more lime than those of the Atlantic, but the quantity of magnesia is not augmented in a parallel manner. When the bottom of the sea consists of argillaceous clay, that is to say, when it consists of silicate of alumina and carbonate of lime, the water becomes richer in lime, and poorer in magnesia. One part of the carbonate of lime is replaced by the magnesia of the sulphate of that base, existing in the water, and forming a double silicate of magnesia and alumina. When the bottom is made up of broken shells, chalk, or quartzose sand, the quantity of magnesia in the water does not change. This circumstance contributes to reinstate in the waters of the ocean the carbonate of lime, which has been removed from it, by the shells of marine animals. The magnesian salts are very characteristic of sea water, and confer upon it many of its peculiarities; such, especially, as its bitter flavour and clamminess. Sea water is said, by Lewy, to contain only half as much gaseous matter as river water, and the quantity varies with the hours of the day. If taken up near the surface it contains the putrid remains of animal substances, which render it nauseous, and, in a long continued calm, even cause the waters to stink.

In the extraction of chloride of sodium from the waters of the ocean, the whole of the above valuable salts have, until very lately, been thrown away, their presence being considered rather detrimental than otherwise in the manufacture of salt from sea-water. In salt prepared by rapid evaporation of sea-water, the insoluble portion consists of a mixture of lime, with carbonate of magnesia, and a fine silicious sand; in the Cheshire brine it is almost entirely carbonate of lime: these being insoluble are easily removed. Chloride of sodium, from its tendency to crystallize in hot liquors which retain other salts in solution, can be easily taken out, as it forms, with a scoop, from those that remain, with the exception of chloride of magnesium, which adheres to, and between the interstices of, the crystals of common salt. This is the most troublesome thing to remove, and if kept in, renders the salt deliquescent, and when in large quantities, causes it to taste bitter. The Scotch variety, which is usually badly prepared, contains it to a large extent. Dr. Ure proposes to get rid of it by mixing quicklime in equivalent quantity to the magnesia present, which will precipitate this earth and form chloride of calcium, which will immediately re-act upon the sulphate of soda present, with the production of sulphate of lime and chloride of sodium. The former being sparingly soluble, is easily separated. Lime, moreover, directly decomposes the chloride of magnesium, but with the effect of merely substituting chloride of calcium in its stead: but in general there is abundance of sulphate of soda present to decompose the chloride of calcium, especially in brine springs. A still preferable method would be to add to it, in the settling tank, the quantity of lime equivalent to the magnesia, whereby an available deposit of this earth would be obtained, at the same time the brine would be sweetened. The solution, thus purified, may be safely crystallized by rapid evaporation. Muriates in salt may be removed by washing the crystals with a saturated solution of brine heated to ebullition, which is not capable of dissolving any more chloride of sodium, but will take up a considerable quantity of the earthy muriates.

The Edinburgh College gives the following directions for the preparation of pure chloride of sodium (*sodæ murias purum*): "Take any convenient quantity of muriate of soda; dissolve it in boiling water, and boil it down over the fire, skimming off the crystals which form; wash the crystals quickly."

In the beautiful and scientific method for the preparation of common salt from sea-water of M. Balard, and now followed by MM. Prat and Agard of Marseilles, purification is unnecessary. By this simple and elegant process, not only is perfectly pure salt prepared, but the other valuable salts existing in the ocean are also extracted.

It appears that the sea-water of the Mediterranean may be concentrated by spontaneous evaporation to density 1·27 without depositing anything but chloride of sodium. The mother liquor, or bittern, when further concentrated, first deposits, as its density rises from 1·27 to 1·32, a mixed salt, consisting of about 40 parts of sulphate of magnesia, and 60 parts of chloride of sodium; or, if the temperature falls to 6° Centigrade (43° Fahrenheit) or 7° Centigrade (45° Fahrenheit), bittern of density 1·32 deposits sulphate of magnesia nearly pure, in the proportion of about 90 kilogrammes of that salt from one cubic metre of fluid. It is proposed to use this salt to convert chloride of sodium into sulphate of soda, being the most economical use of it. The next important product is the double chloride of potassium and magnesium, which serves afterwards for preparing the chloride of potassium. This double salt is deposited from the bittern concentrated to density 1·345 by spontaneous evaporation, after the deposition of the magnesian salts; or by artificial heat in an evaporating pan. Dissolved in a small quantity of hot water, the double chloride undergoes decomposition, and allows the chloride of potassium to crystallize nearly pure on cooling. The last mother liquor above the density of 1·345, after the removal of the potash, contains much chloride of magnesium; a salt which may

be had recourse to as a source of hydrochloric acid, being decomposed by distillation. The most valuable of these salts is the chloride of potassium, and M. Balard looks to sea-water as the great natural source of potash. The water of the Mediterranean contains, according to the analysis of M. Usiglio, 0·0505 pound of chloride of potassium in 100 pounds of water, or about $\frac{1}{2000}$ part of its weight of that salt.

The commercial salt of this country is for all dietetical and therapeutical purposes sufficiently pure; its low price being a guarantee against adulteration. Some years ago a vulgar and injurious prejudice prevailed that foreign salt was more powerful, and better for curing, or "striking" as it is technically called, fish and meat, than English salt. Dr. Henry, however, has proved to the Royal Society, in a paper read before them in 1809, that not only is English salt as powerful, but in some respects superior to the foreign salt. The following "Table" of the composition of various varieties, is taken from his paper:

ONE THOUSAND PARTS BY WEIGHT CONSIST OF—

KINDS OF SALT.	Pure Muriate of Soda.	Muriate of Lime.	Muriate of Magnesia.	Total Earthy Muriates.	Sulphate of Lime.	Sulphate of Magnesia.	Total Sulphates.	Insoluble matter.	Total Impurity.
Foreign Bay Salt:									
St. Ube's	960	trace	3	3	23½	4½	28	9	40
St. Martin's	959½	do.	3½	3½	19	6	25	12	40½
Oleron	964¼	do.	2	2	19½	4½	24	10	36
British Salt from Sea Water:									
Scotch (common)	935½	...	28	28	15	17½	32½	4	64½
,, (Sunday)	971	...	11½	11½	12	4½	16½	1	29
Lymington (common)	937	...	11	11	15	35	50	2	63
,, (cat)	988	...	5	5	1	5	6	1	12
Cheshire Salt:									
Crushed Rock	983¼	$0\frac{1}{16}$	$0\frac{3}{16}$	0¼	6½	...	6½	10	16¾
Fishery	986	0¼	0⅜	1	11¼	...	11¼	1	13¼
Common	983½	0¼	0¾	1	14½	...	14½	1	16½
Stoved	982½	0¼	0¾	1	15½	...	15½	1	17½

Much of the salt sold in this country as "foreign bay salt" is only the large grained Cheshire salt. In France, where salt is of a greater value than in England, serious accidents have arisen in consequence of the use of sophisticated salt.

(To be continued.)

INDUSTRIAL INSTRUCTION.

The Report of the Committee of the Council appointed on the 19th of January last, to inquire "how far and in what manner the Society of Arts may aid in the promotion of such an education of the people as shall lead to a more general and systematic cultivation of arts, manufactures, and commerce—the chartered objects of the Society," has just been published.* The Committee was composed of the Rev. Dr. Booth, F.R.S., Chairman and Reporter; Mr. Bell, Mr. Twining; and Mr. Peter Le Neve Foster, the present Secretary.

The first proceeding of the Committee was to endeavour to ascertain, with as much accuracy as possible, the sentiments of manufacturers themselves upon this question. For this purpose a circular letter was addressed to many of the leading manufacturers, from whom a decided expression of opinion was obtained as to the urgent necessity of an improved Industrial Instruction. A second circular was then addressed to those who had studied the subject of education as a great social question, as it was felt that if the results of the knowledge and experience of such men should be freely communicated, the value of the Report would be much enhanced. Circulars similar in purport to the preceding, but somewhat varied in form, were also addressed to the Directors of most of the large Mechanics' Institutions, to the Head Masters of the Endowed Grammar-schools, and to the principals of several proprietary and private schools. In these circulars there were eight distinct suggestions on which opinions were asked; and as the replies to these are taken separately in the Report, it will be convenient to follow the same order.

* "The Report of the Committee appointed by the Council of the Society of Arts to inquire into the subject of Industrial Instruction; with the Evidence on which the Report is founded. Published under the sanction of the Council of the Society of Arts." 5s. 8vo. Longman and Co. 1853.

The first suggestion on the list was:

"I. The improvement of the Endowed Grammar-schools, more especially of those which are not intimately connected with the Universities; to enlarge them, so as to introduce among the subjects taught the elements of Industrial Instruction."

The replies which have been received to this suggestion are very various; but it is stated, that "they all, without a single exception, evince, on the part of the writers, an earnest desire to improve, if they only knew how; to reform, if practical reforms were submitted. Some suggest that new rules be framed for the existing trustees; some, that the appointments to the head-masterships should be taken out of the hands of trustees, and vested in a Central Board;" or at least, that the local electors "should be restricted in their choice to certificated candidates;" but it is asserted by many that reform in the Universities "must, as a matter of necessity, precede reforms in the Grammar-schools." "Others, again, are convinced that the Government should issue a Commission of Inquiry to examine into, and to report as to the present state of the Grammar-schools in England and Wales, originally intended to benefit the poor. Many are indignant with the Court of Chancery; some complain of their visitors and trustees. Several desire to be supplied with well-qualified assistants," stating that persons able "to teach the elements of the natural sciences are not to be had;" and that if they could be found, higher salaries would be required than the present funds of these schools could meet.

The second suggestion on the list was:

"II. The conversion of the present Mechanics' Institutions into Industrial Colleges."

Although this suggestion met with very general ac-

ceptance, it is considered that the evidence is by no means conclusive, and that it would be injudicious to interfere with them; because though imperfect as places of elementary instruction, they do still supply a want in our social system. Any change that might interfere with the perfect freedom of self-government they have always enjoyed, is deprecated; but it is thought "that aid, judiciously afforded, might enable many of them to supply that elementary instruction, of the grievous want of which they all so loudly complain."

On the third suggestion,

"III. The introduction into proprietary schools and colleges of a system of instruction better suited to the wants of the middle classes,"

but little is said. The failure of these schools is attributed to the attempt to combine the old grammar-school system with a more modern one; and the effect has been, that the education of the middle classes is in a very unsatisfactory state, especially as compared with that of the classes immediately below them.

The next suggestion,

"IV. Whether aid, in the first instance at least should be afforded by supplying, at a reduced cost, maps and models, diagrams and apparatus,"

met with unanimous approval. It is conceived that the value of a Central Establishment for this purpose cannot be over-rated, and that by its means "every new improvement, wherever made, whether in the exposition of the principles of science, or in the manner of teaching and illustrating them, would soon be made known in the remotest districts of the country." This plan has been found necessary in the case of large public bodies dealing with elementary popular education, and would still, it is believed, be required, should "an improved instruction in the principles of natural and physical sciences be established." Some correspondents urged that it was not advisable to undertake to supply the apparatus of a system which was yet to be developed; and that it would be better to allow the system to grow up day by day, than force it into existence, by which neglect might arise, as had been the case with the numerous museums of the country.

On the fifth suggestion,

"V. That systematic and defined courses of study be recommended;"

the expression of opinion was not very general, owing to its being practical rather than abstract. The preparation of good manuals and text books was, however, strongly recommended by several correspondents.

In regard to the next suggestion,

"VI. That something in the nature of a system of prizes, exhibitions, or scholarships, be provided. Innumerable rewards exist at present for the cultivation of classical learning; why should there not be some for the promotion of industrial knowledge?"

much diversity of opinion was expressed. "While a great number of correspondents speak of it in the highest terms; others, on the contrary, whose opinions are entitled to grave consideration, make light of inducements of this nature; while some dwell on the principle that men should cultivate knowledge on higher grounds than the mere hope of honour or reward; others take the more practical view, that the hollowness of such rewards as medals and prizes, is quickly seen through, and that they very soon become objects of contempt." Scholarships, or other pecuniary aids, to enable students to cultivate to still higher perfection those talents with which they have shown they are endowed, are considered, however, to stand on a different principle; or else, "To what is the excessive study of the classics at the universities due, but to the exhibitions, the scholarships, the prizes, and the fellowships, which with certainty await and reward proficiency in them?"

The seventh and eighth suggestions,

"VII. To hold public examinations at certain central localities, for the purpose of awarding such prizes."

"VIII. To award to candidates who should distinguish themselves certificates of different degrees of merit. Such certificates, if carefully awarded, and after due examination might be made, as all analogy shows us, of great importance,"

met with the most cordial and unanimous approval from all persons. Indeed, it was said that any proposed plans of instruction, however excellent in theory, would fall into disuse but for examinations. Honorary prizes, as books or medals, being necessarily limited in number, must be conferred on relative, not on absolute merit, thereby fostering jealousies, and causing dissatisfaction; besides being at the same time transient in their influence. Now certificates of different grades, granted after careful inquiry and searching examination, seemed, to be free from all objections of this kind. They would also tend, it was conceived, to prolong the duration of school attendance, a point of vast importance, as the early removal from school was said to be one of the most hopeless features of the present day.

The views submitted to the Committee are thus summed up: "That a central Institution be established in London or Manchester, or in some other convenient locality. That, on the plan of the London University, it should admit into union with it, colleges, Mechanics' Institutions, schools, and even private seminaries; that the conditions of affiliation should be few and simple; that, like the London University, it should hold examinations; not, however, in London only, but throughout the provinces also. Unlike the London University, it should not only examine, but teach. It should be its especial duty to train masters as teachers of science, so far as it bears on industrial instruction; and not teachers only, but those also who intend to follow other occupations." * * * "The central Institution to have attached to it exhibitions or scholarships to reward those students who, at the local examinations, should distinguish themselves, to enable them to receive a higher kind of instruction."

The Report, in conclusion, refers to the Department of Science and Art, in connection with the Board of Trade, recently established by the Government, and says, that "much of the duty of the central body, to which reference has so frequently been made in the Report usually implying the Society of Arts, will now be assumed by the Government Department."

It may be stated, that the Committee received between 500 and 600 communications. Many of these are given in the Appendix to the Report, including letters from M. Arnoux, of the Potteries; C. Babbage, F.R.S.; M. Bontemps, of Birmingham; Sir David Brewster; Messrs. Broadhead and Atkin; Mr. Robert Chambers; Mr. W. Crum, F.R.S., of Glasgow; Mr. Ellis; Mr. Fairbairn, F.R.S., of Manchester; Mr. Felkin, of Nottingham; Mr. R. Fort; W. R. Grove, F.R.S.; Mr. Arthur Henfry, F.R.S.; Mr. Hick, of Bolton; Leonard Horner, F.R.S.; Professor Johnston, of Durham; the Rev. Dr. Kennedy, of Shrewsbury; Sir Robert Kane; Dr. R. G. Latham, F.R.S.; Professor Long; Mr. Mechi; Mr. J. Mercer, of Oakenshaw; Professor Miller, of Cambridge; Mr.

Herbert Minton, of the Potteries; Professor Moseley; Mr. R. Napier, of Glasgow; Mr. J. Nasmyth, of Manchester; Messrs. Nelson, Knowles, and Co., of Manchester; Mr. Osler, of Birmingham; Professor Phillips; Lieut.-Col. Portlock; the Rev. F. D. Zincke, &c., &c.; forming a most valuable body of evidence, such as is not to be found in any other place. It was intended that all the letters should be printed; but it was thought that the expense so incurred would cause the selling price of the book to be unduly raised.

HOME CORRESPONDENCE.

LECTURES.

Mechanics' Institution and Literary Society,
Leeds, July 9th, 1853.

SIR,—May I request a little space in your Journal to discuss some of the topics raised in the letter from Mr. J. H. Millard, of Huntingdon, which appeared in yesterday's number?

Your correspondent seems to think that in indicating a geographical division of the classes of lectures suitable for Institutions, he has given the Society of Arts a clue to the removal of all the difficulties that beset this subject. We, of the North, have, it is intimated, an ostrich craving for the hard realities of science, and really ought to be forced to take a little literature and *belles lettres*, to save us from "vulgar utilitarianism;" but the people of the South are supposed to have a liking for the "desultory dissertations despised at Oldham," with an especial desire for lectures typified by those of George Dawson and Mrs. Balfour.

If the speculation of our Huntingdon friend had any relation to or consonance with the facts, we might congratulate him as a great discoverer in the field of Institutional economics; but we must modestly forego the compliment paid to the scientific tendencies of the North, when we find that at the Manchester Institution while in fourteen years 902 lectures have been given, 452 of these, or 50 per cent., were on Literature, the Fine Arts, Drama, &c., and 450 on Science; and in a paper, I believe by the late Mr. Hogg, in "Chambers's Papers for the People," it is stated that of 1000 lectures delivered at forty-three Institutions, 660 were on literary subjects and music, and on science but 340, or only about 33 per cent.; and these data were chiefly, if not wholly, procured from the more Northern Institutions. Turning to our local returns for last year, it appears that at Bradford, out of 27 lectures, 18 were on various literary topics, and 9 on science, or only 33 per cent.; while the statistics of the Yorkshire Union for the year give the following summary: of 478 lectures given in 67 Institutions, 350 had literature and music for their subjects, and 128 were on science.

As I am not aware that any similar comparison has been made respecting the lectures given at Institutions in the South, I cannot show whether a larger proportion of literary lecturing characterises those societies; but I think I have established the fact, that we are not completely under the *iron rule* of science; that we take a good share of "sack" to our bread, and that our draughts of positive philosophy are "craftily qualified" with literature, *belles lettres*, and the other "humanities."

But that it would engross too much of your space, I could show, however, that this is not all matter of choice; a large number of the lectures referred to in all these statements are gratuitous, and it is so much easier to find men competent to take up literary than scientific subjects, that the former constitute the chief part of these unprofessional lectures.

I apprehend, Sir, that while we are thus seeking to get at a practical conclusion on this vexed matter by supposing a geographical distribution of taste, and possibly we may yet have an ethnological theory to supply any deficiency in that which takes locality for its basis, we may find all that is essential for us to know, with very little exercise of penetration. When, some years since, I asked a gentleman catering for a flourishing Institution in Lancashire, with reference to some lectures he was inquiring about, whether the members would tolerate a strong infusion of the mirth-moving element, his conclusive reply was, "Sir, human nature is the same in Lancashire as in Middlesex." I commend the philosophy of this sagacious dictum to all who seek to establish a distinction where there is no essential difference among bodies of people. I could easily show that it frequently happens —much too frequently—that in the midst of a manufacturing population, the bulk of the members of an Institution have no direct connection with actual manufactures; and moreover, that the more intellectual of the artizan class are very apt to devote themselves to literary studies, while the cultivation of science is pursued by those unconnected with mechanical or manufacturing operations: possibly this is it not as it should be, nor as it would be if these Institutions had made it a duty to give regular instruction in the elements of science to all the junior members; but it tends to prove that there is no necessary relation between a man's daily avocations and the mode in which he prefers to employ his leisure.

The real want of all Institutions — and by Institutions I mean the members constituting them—is, something which will gratify the senses, excite the imagination, and give an insight, however slight or transitory, into the mysteries of that world of knowledge, always in great measure beyond the ordinary ken of the mass of the people. If the scientific expositor possess the rare power of captivating the attention by the wonders of science, and satisfying the understanding with some coherent narrative of the great results, and explanation of the general laws of natural phenomena,—if he can illustrate the unknown and obscure by the familiar things and occurrences of daily life,—he will be listened to with eagerness, I had almost said with reverence: but he must be so consummate a master of the minds of an audience, that it may be considered they rather come to hear *him* than his subject. Now the rarity of finding men uniting these qualities, the exceedingly small number I should be enabled to name, were I disposed to be so invidious, among the men of science who have become popular advocates of science rather than its expounders, gives us little hope of seeing much successful scientific lecturing to the people. And although there may be a considerable utility in this sort of panoramic lecturing, it can scarcely be expected that men of standing will be ambitious to signalise themselves in these displays; hence there must always be a difficulty in supplying this kind of lectures; and certainly the more the members of any Institution devote themselves to regular study, the less they will prize such lectures. Now, as regards Literature, Art, and Music, it is much easier to find men competent to address mixed audiences with interest; the subjects are of a class which usually appeal to man's own nature and ordinary observation for evidence; hence, a man who shall be puzzled to comprehend the primary laws of the atmosphere, and be bewildered by the philosophy of levers, inclined planes, and the resolution of forces, may listen with attention, deep gratification, and perhaps moral and intellectual

profit to a discourse on the poets; in the former case, to his untutored mind all the principles appealed to are to be gathered from without; in the latter, he has them all within.

The axiom, that "those who live to please, must please to live," applies with as much truth to Mechanics' Institutions, as to any other candidates for public countenance and support. With regard to the supply of the popular article, whether through the agency of the Society of Arts, or by the more direct encouragement of Institutions, it will always be limited by the very nature of the case, and again by the cost; and I cannot see any mode of surmounting these difficulties. The want is, I believe, a *temporary* * one, and it must be supplied as far as practicable by the resources available. If from the circumstances of an Institution, it cannot engage men from a distance to stir up the minds of the members, and this process is desirable, then let the best use be made of local talent; where this takes the direction of popularizing science, so much the better; but if it is of a kind to render it repulsive, eschew it altogether. If lectures cannot be given both calculated to interest and instruct an audience, and which so commend themselves to the public as to induce good attendances, then a committee may depend on it they have missed their way either in the selection or the mode of advertising such lectures.

So much depending on the MEN who lecture, I am satisfied that one of the best services the Society of Arts could render to Institutions would be the publication of a list of lecturers, and their addresses, with subjects, and the names appended to each of four or five Institutions at which he has appeared. If not giving all the information desired, it would at least supply much that is perpetually in request at all Institutions, and the want of which occasion endless correspondence and disappointment. Such a list should be as comprehensive as possible; there could then be no complaint of unfair selection, and the aspirant for distinction in this walk would not be excluded from all chance of success. Opportunities would also be afforded of ascertaining opinions of a lecturer from several sources.

As regards joint engagements the principal point appears to be, to get some means of putting Institutions in any given district in communication respecting their lecture wants. As it will usually be found that in a given area, say of 100 miles, there will rarely be more than twenty, or at most thirty Societies, which engage lecturers, these might select from such a list as I have mentioned the gentlemen they wish to engage, and send this to the Society of Arts, which might send a circular to the whole of such Institutes, including their collected proposals; and the ultimate correspondence could either be conducted by one of the local Secretaries, or the Society.

But whatever is done the most valuable service would be rendered by a List of names. There is no doubt much delicacy is required on the part of the Society of Arts in giving its recommendation to a lecturer; and it is questionable whether it would not feel somewhat scandalized by countenancing some lecturers in good esteem among many Institutions, but who carry popularity of style to the verge of charlatanry; while on the other hand, it is not difficult to suppose that the Society, naturally solicitous to promote the sound and useful, might lean to a class of lecturers whose high attainments may not be accompanied by a corresponding power of employing them agreeably. Altogether I believe the Society will be most useful in helping us to learn whose services are available, how we can ascertain their qualifications, and facilitating communications and arrangements in any mode most practical, leaving us entirely to our judgment in the selection.

The foregoing remarks apply exclusively to *popular* lectures, those intended to be listened to by the whole of the members, old and young, educated and uneducated, and of both sexes.

I am, Sir, your obedient Servant,
W. H. J. TRAICE.

To the Secretary of the Society of Arts.

* I say the want is *temporary*, because I am convinced that the popular skimming of a subject, which is alone practicable in a popular lecture, only tantalizes those who possess any amount of knowledge respecting it. The surgeon does not care to hear eloquent discourses on the first lines of physiology; the chemist who has once learned to weigh and measure, smiles at the chameleon pranks of the experimenter, quite as marvellous to the vulgar as the wizard's bottle, whence flow many-coloured drinks, and scarcely more instructive; and the tyro in natural philosophy is amazed to find a lecturer solemnly demonstrating the common properties of fluids. Only, therefore, while all wholesome instruction in the elements of general physics is so rare, can the popular demand for *talking about science*, rather than discourses upon it, exist. *Teaching* can be carried on in the class-room, and nowhere else.

MUSIC LICENSES FOR INSTITUTIONS.

SIR,—I am very anxious to learn through the Journal, whether or not it is necessary for the Trustees of Literary Institutions to take out a Music License, for the purpose of having musical lectures, concerts, &c., in their hall, or lecture theatre. For the last three or four years we have done so, being threatened that unless we did, we should be informed against, and made to pay the penalties; but the license costs us yearly 4*l*. 14*s*. 6*d*., and this is too large a sum to spend, if not absolutely necessary.

I fear that as the law at present stands, we are clearly liable, and should be so according to *the letter* of the law, whether we let our rooms out publicly or not, if we took money, or consideration for money, (whether by ticket or otherwise) as the means of entry;—in this way those of our nobility who have concerts in their drawing-rooms, as we see occasionally done, and when admission is by ticket, for which money is paid, are also liable.

The expense of a license is not a fee paid to the Crown, for I believe none, or a very small one, is charged, but is incurred in the way the license is to be obtained. In our own case, for instance, we have to petition the Petty Sessions, to recommend us to the Quarter Sessions; this is required to be done in a particular way, and we must employ some solicitor to draw it up. This petition has to be backed by a recommendation from the inhabitants, and to obtain this, some one of us must go round the town and solicit signatures,—no very pleasant employment to go through every year. Having done all this, and obtained the approval of the magistrates at the Petty Sessions, it has to go to the Quarter Sessions, where on motion of counsel, who of course must be paid, the license is granted. Now this costs us 4*l*. 14*s*. 6*d*., all of which I believe is spent in fees and legal expenses; and after all it is only done to take care that concerts, &c., are not given in improper places, such as low public houses; and in order that so licensed, the police and magistrates may at any time enter and see that, under cover of a music license, nothing illegal is being transacted. I cannot help thinking that an Institution having once satisfied the authorities of the nature of its organisation, and having obtained permission to hold concerts, &c., in their rooms, should hold this in force without being subject to an annual renewal; in the

same way as, in our case, one of our rooms is licensed for a place of religious worship, and this license once obtained, and obtained too at a cost of 2*s.* 6*d.* for entry fee, remains in force from year to year without renewal.

Yours, &c.,

P. P.

LOCKS.

Sir,—Mr. Hobbs having made no reply, through your Journal, to my letter of the 2nd instant, but having answered a challenge made to him since the publication of mine (by another person) in the *Times,* I must, I suppose, infer that the paragraph contained in that answer—in which he says, "It seems to be taken for granted that I am open to challenges like that of Mr. Cotterill, if only a sufficient inducement is held out in the shape of a pecuniary reward. I beg to assure that gentleman, *and others who have made the same mistake*, that they will hardly catch me 'tinkering' with my 'basket full of instruments,' either upon their demand, or that of any other man"—is to be the only answer Mr. Hobbs deems it advisable to make to my offer.

That I have no right to "*demand*" of Mr. Hobbs that he shall make the attempt to pick my lock I am willing to admit, as, in so far as I know, he has never ventured to insinuate that it is either insecure in principle or arrangement; but acknowledging this, as I readily do, Mr. Hobbs will still "find some difficulty in convincing either the Society of Arts or the Public" that even his ultra-republican sensitiveness at such demands being made upon him would operate so forcibly as to prevent his availing himself of the pecuniary reward I have offered him, unless this sensitiveness were accompanied in his mind with a very strong conviction that any attempt to avail himself of it must of necessity be futile.

The principles of my lock being entirely new, I may be allowed to say a few words respecting them.

The reason that combination locks can be picked is simply this—that access to the combination parts in them can always be obtained whilst they are in contact with the piece which prevents the bolt from being unshot, unless the combination parts are correctly arranged in position. The obvious remedy, is so to construct a lock that such access is impossible, and this I effect by completely closing up the key-hole during the whole time of such contact, making it impossible to unshoot the bolt whilst the key-hole remains open, or whilst the key or any other instrument remains in it. No skill is of any avail, consequently, towards acquiring a knowledge of the requisite positions for the combination slides; and to prevent its being picked by exhausting the chances, I have inserted a part which I designate the "detector bolt," which (should any prolonged attempt be made to pick the lock, and the person trying at length succeed in stumbling upon the positions for the slides, which must first pass the opposing plate) would at once be brought into action, and all further movement of the lock's mechanism entirely prevented; the key-hole remaining hermetically closed, no further attempts to pick the lock could be made. Of both the above principles I claim to be the original inventor and patentee; and I can only say, in conclusion, that my offer to Mr. Hobbs will remain open until the expiration of the time specified, that he may prove, if he can, any deficiency in them.

Respectfully yours,

Walter H. Tucker.

SOCIETY OF ARTS' PREMIUMS.

Sir,—The discussion which is now being carried on respecting Mr. Saxby's lock will, I hope, lead to the opening up of the question, whether the Society's premiums are calculated to advance the cause of the industrial arts.

During the long period of the Society's existence, the sums expended by the Society in premiums have been very large; and it is to be hoped that the expenditure has rendered some assistance to the progress of the useful arts, and the applied sciences.

There is, however, an opinion among scientific men, and persons qualified to judge of the merits of inventions, that the Society has been too indiscriminate in the bestowal of its favours. Thus to quote only one example, Mr. Edward Troughton, in describing his *Dividing Engine*, in the "Edinburgh Cyclopædia," refers to a contrivance "by Mr. James Allen, an industrious workman, which he styles a self-connecting method of racking the plate, and which with the usual good-nature of the Society of Arts, was honoured with their gold medal." Mr. Troughton in the course of his description of the very difficult and delicate operation of racking the edge of the dividing plate of his engine, states why he considers Mr. Allen's invention to be of questionable value, and remarks, with more wit than reverence, that "in mechanical matters, faith is but a poor substitute for good works, and ought never to supersede the use of the senses."

It is not to be supposed for a moment that the eminent men who now compose the Council of the Society of Arts, would distribute the rewards of the Society by the easy exercise of good nature, instead of a correct judgment based upon a scientific and technical knowledge of the merits of the invention upon which they adjudicate. But I venture respectfully to express a doubt whether in so wide a range of subjects as is usually embraced by the Society's Premium-list, the Council, or the Committees appointed by the Council, can be in a condition to bestow their time, or to command that amount of technical information which shall convince the public that the Society has exchanged its character for benevolence for one of sagacity.

The question may now, I think, be fairly considered, whether the progress of the industrial arts does not admit of being promoted more effectually by other means than the bestowal of gold medals and money premiums, —such, for example, as the dissemination of sound information by means of *Lectures* and *Papers* by competent men; by the publication of a *Journal* of Industrial Art, of a far wider and more comprehensive character than the present one; by the formation of a large and well-selected *Library*, and a well-arranged industrial *Museum;* in short, by endeavouring to render the Society of Arts an exponent of the state of the useful arts and manufactures of the world, to which any one seeking information might turn as to an intellectual index, and find a prompt and satisfactory answer to his inquiry.

I venture to suggest, that the offer of premiums does not tend to develop talent. If sums of money be offered for the best Essays on particular subjects, those who are best qualified to write are not likely to compete on an uncertainty, for there is always a demand for the services of men of talent; while, on the other hand, those who have the leisure to write long Essays for prizes, seldom have much to say that has not been already better said.

With respect to inventions, the case is somewhat similar. My position is, that the offer of a small money-

premium, or of a medal, does not stimulate invention, or set competent men to work to make discoveries *to order*. A man who has made a really good invention is not likely to bring it, in the first instance, to the Society of Arts; he would probably do one of three things: 1st, He would keep it to himself, and make a profit by it; 2nd, He would sell it to a manufacturer; or, 3rd, He would make it the subject of a patent. If it be a discovery involving the extension of the boundaries of knowledge, the discoverer would probably seek publicity in a more purely scientific Society than ours. In either case we are likely to be visited by a very inferior class of inventors and discoverers; and seldom, I do not say never, by men of genius.

Doubtless there have been occasions when the premiums of the Society have encouraged individual inventors,—men belonging to a past age, and to a different state of society,—men with little or no science, but who, by dint of untiring industry, and repeated failures, attained certain results of some value, but which are now attained by well-directed science, grafted on practical knowledge. The picture of a poor inventor working at his model, in the privacy of a solitary attic, denying himself and his family the necessaries of life, in order that he may keep before his eyes the mirage of a prosperous future,—such a picture now belongs rather to fiction than to actual life. An inventor now-a-days must be a highly educated man; that is, well versed in the science of his art, and with a profound knowledge of its practice. The introduction of the manufacturing system, and the enormous demand for automatic machinery, has raised up a class of highly educated and accomplished engineers, who have superseded the Arkwrights, the Hargreaves, the Comptons, &c., &c., and have reduced invention to the laws of inductive science.

For these and other reasons of a similar kind, I venture to recommend that the Society cease to offer premiums and rewards for inventions and discoveries It may be objected that we thus relinquish one of the characteristics of the Society. It may not, however, be necessary to relinquish it, but only to modify it. The plan adopted by the British Association for the Advancement of Science, appears to be a practically good one. If the Society required an Essay or a Report on some branch of science, they invite a competent person to prepare it. If they desire to promote some experimental inquiry, they vote a sum of money to competent persons for conducting the experiments, and reporting thereon. I would ask the opinions of the members of the Council of the Society of Arts, and of the members at large, whether if the Society make grants of money at all, the great cause of industrial education would not be essentially promoted by engaging the services of intelligent manufacturers and others, to prepare Reports on the present state, the wants, and future progress of the various useful arts and manufactures, and to publish such Reports for the benefit of the members, and of the public generally? There are a vast number of questions connected with manufactures which require experimental investigation. Sums of money might be voted from time to time for conducting the experiments. The extension and improvement of the library and museum, the enlargement of the Society's Journal, the reading of papers, and the delivering of lectures, are points which I may probably again refer to in another letter.

I remain, Sir, your obedient Servant,

CHARLES TOMLINSON.

London, July 18, 1853.

TIPPET'S COLD WATER STEAM ENGINE.

Parkstone, Poole.

SIR,—I have been much surprised to see so many notices of this invention inserted in the daily papers without an acknowledgment, or allusion to the original inventor, Mr. Jacob Perkins, an American by birth, but domiciled in England, who, about thirty years since, took out a patent for a cold water Steam-engine, with generators, as a substitute for the ordinary boilers.

Mr. Perkins's invention, being the subject of a patent, could not then come under the notice of the Society; but the members, as individuals, paid frequent visits to his manufactory, and derived much pleasure from witnessing the very great ingenuity displayed in the construction of so extraordinary a machine; for Mr. Perkins's aim was, to make an engine of the size of an ordinary two-horse power Steam-engine, which should do the work of one of twenty-horses power.

Mr. Perkins also produced a machine capable of proving the condensation of water under excessive pressure, and was the first to construct a steam-gun. He also attempted the impulsion of steam-boats, by means which may be considered as the original of the screw, in the shape of two fan-wheels on the same axis, but revolving in contrary directions, in order to obviate any tendency to drive the boat to port or starboard, the oblique vanes of his wheels being merely portions of a many-threaded screw. These facts are no doubt known to many still living, and I shall therefore decline entering into any controversy upon the subject.

Yours truly,

July 18th, 1853. HENRY W. REVELEY.

PROCEEDINGS OF INSTITUTIONS.

FORDINGBRIDGE.—The exhibition, in connection with the Literary, Scientific, and Mechanics' Institution, opened on Monday week. Lord Shaftesbury was prevented attending, as was also the vicar, the Rev. C. Hatch. The Rev. J. T. Bartlett opened the proceedings with a short inaugural speech; after which the company dispersed throughout the hall and adjoining tents. Complete success has attended the whole undertaking; so much so, that the committee determined on keeping the exhibition open during the remainder of the week. A stall for the sale of fancy articles, for the benefit of our school established during the past winter, realised a considerable sum of money. Among the articles exhibited was a beautiful statue of Young Bacchus, from Sir Charles Hulse, who also lent many other articles of worth and rarity. A figure of Christ bearing the Cross, from Mr. Taylor, of Romsey; plate, from Mr. Pegler, of Southampton; and rugs, from Messrs. Blackmore's, of Wilton, were particularly admired. Of the tradesmen of the town, Mr. Waters and Messrs. Hutton sent drapery goods; Mr. Haydon, cases of stuffed animals; Messrs. Cusse, stationery and fancy articles; and Mr. Hillary, ironmongery in great variety Messrs. Thompson and Co. sent specimens of their sailcloth manufacture, from its commencement in the green flax to its completion. The Rev. C. Hatch sent paintings, and specimens of antique china. Mr. Locke sent a circular table of his own manufacture; and Mr. J. Hannen various articles of interest. Mr. Keily, of Bournemouth, exhibited an Indian screen, and specimens of wool-work and tapestry. Dr. Mainwaring, of Bournemouth, sent a worked screen. Mr. Blake and Mr. Roe, of Salisbury, exhibited stationery; Miss Mul-

lens, fancy wool-work; and Mr. Roe, an Austrian fountain playing eau de Cologne. Mr. Adams, of Ringwood, sent jewellery, watches, &c.; and Messrs. Chubb, of St. Paul's Churchyard, specimens of their locks, &c. Two large glazed cases contained Indian and other curiosities, mostly contributed by the neighbouring gentry. The Society of Arts contributed a large number of calotypes and photographic pictures, as well as good specimens illustrative of glass manufacture. Most of the families in the vicinity sent articles of beauty and rarity from their respective mansions, and the principal persons in the town appeared to have vied with each other in making the exhibition attractive and successful. Mr. J. Curtis's little wind instrument, a clavelina, and White's beehive in full work, must not be omitted.

MISCELLANEA.

Production of Gold by Artificial Means.—M. Theodore Tiffereau, a Frenchman, says that he has discovered the means of making gold. In a paper laid before the Academy of Sciences, entitled, "The Metals are not simple, but Compound Bodies," he has put forth his views, and asserts that he has actually produced gold by artificial means. He proceeds upon a principle, admitted by all chemists, "that the properties of bodies are the result of their molecular constitution," and he adduces numerous examples in chemistry—in which bodies assume different properties according as they have crystallized in one form or another, although their composition remains the same. All that he had to seek was a substance which, by its catalytic forces would act upon the body which it was desired to transmute, and then to place this last under certain conditions in contact with it to effect the change. He believes that there are but very few simple substance, in nature, and considers that the forty metals now assumed to be such are in reality combinations probably of one radical with some unknown body hitherto not studied, but which of itself alone modifies the properties of this radical, and thus presents us apparently with forty bodies whilst in reality there is but one. If any one have discovered this body which has hitherto escaped the researches of philosophers, and can cause it to act on any given metal, is there anything surprising that he can change the nature of the metal by giving it with a different molecular constitution, the properties of that metal in which this constitution naturally exists? This he asserts he has done

Operation of the Smoke-consuming Act in London.—The Committee of the House of Lords on the Whitechapel Improvement Bill, the Earl of Derby in the chair, took some interesting evidence on the operation of the Smoke-consuming Act throughout London. Professor Brande, Superintendent of the Coining Department of the Mint, deposed that the furnaces there were supplied with the smoke-consuming apparatus, and that the volumes of smoke that formerly annoyed the neighbourhood were now done away with. Carbonic acid gas was evolved, however, in invisible smoke, but not to an extent deleterious or injurious to health. A material saving resulted from the lower priced coal burned. One or two of the breweries in the City of London, the smoke from which used to be a great nuisance, now consumed it entirely, and the saving effected in the fuel was calculated to pay the first cost of apparatus in the course of three years.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. No. *Delivered on 14th July*, 1853.

649. Durham Election (Special Inquiry)—Report from Committee.
700. Trinity House Charities—Paper.
729. Post-Office—Return.
732. Post-Office Department (Packet Service)—Estimate.
746. Customs Duties (Isle of Man)—Treasury Minute.
629. Great London Drainage Bill—Minutes of Evidence.
695. Bills—Improvement of Towns (Ireland).
738. ,, —Thames Embankment (as amended by the Select Committee.)

Delivered on 15th July.

677. Arterial Drainage (Ireland)—Return.
715. Police—Second Report from Committee.
720. Parliamentary Papers—Report from Committee.
725. Bills—Dublin Carriage (Ireland).
749. ,, —Patronage Exchange.
750. ,, —Colonial Bishops' Act Extension.

British Fisheries—Report of Commissioners.

Delivered on 16th and 18th July.

683. River Fergus—Copies of Correspondence.
728. Fire Insurance—Account.
741. Government of India Bill—Further Correspondence.
745. Ramsgate Harbour—Copy of Sir J. Rennie's Reply.
753. General Committee of Elections—Mr. Speaker's Warrant.
754. Bills—Juvenile Offenders.
755. ,, —Land-Tax Redemption.
760. ,, —Succession Duty (as amended in Committee on re-commitment, and on consideration of Bill as amended.)
762. ,, —Highway Rates.
763. ,, —Turnpike Trusts Arrangements.
764. ,, —Turnpike Acts Continuance, &c.
765. ,, —Metropolitan Sewers Acts Continuance.
766. ,, —Sheep, &c., Contagious Diseases Prevention.
767. ,, —Public Works Acts Amendment (Ireland).
774. ,, —Consolidated Annuities (Ireland).
778. ,, —Universities (Scotland), amended.

Lunatic Asylums (Ireland)—Sixth General Report.
Criminal Offenders (Ireland)—Tables.

Delivered on 19th July.

675. Superintendent Constables—Abstract Return.
717. Piracy (Borneo)—Copy of Correspondence.
727. St. Luke, Chelsea—Copies of Correspondence.
737. Post-Office—Accounts.
225. Bills—Poor Relief Continuance.
719. ,, —Probate and Administration.
739. ,, —Copies of Specifications Repeal (amended).
776. ,, —Expenses of Elections (as amended in Committee on re-commitment, and on consideration of Bill as amended.)

Delivered on 20th July.

769. South Sea and other Annuities Commutation—Return.
771. Benefices—Return.
772. Chevalier Mustoxidi (Ionian Islands)—Papers.
773. Public Income and Expenditure—Account.
777. Militia Estimates—Report from Committee.
784. Bills—Burials (beyond the Metropolis).
785. ,, —Employment of Children in Factories.
786. ,, —Drainage of Lands (Ireland) Act Amendment.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 15th July, 1853.

Dated 30th March, 1853.

761. L. M. Lombard—Motive power.

Dated 18th June.

1491. J. M. Hyde—Steam-engines, and production of steam.

Dated 21st June.

1519. J. Giret—Artificial and malleable stones, and apparatus for same.
1520. J. Leach—Looms for weaving.

Dated 28th June.

1559. C. Minasi—Concertinas.
1561. A. E. L. Bellford—Steam-boilers. (A communication.)
1563. J. H. Johnson—Turning over leaves of books, &c., and apparatus for same. (A communication.)

Dated 29th June.

1565. F. Steiner—Manufacture of wooden rollers.
1567. J. Patterson—Reaping and mowing machines.
1571. P. A. de St. Simon Sicard—Apparatus for raising sunken vessels, &c.
1573. S. W. Wright—Permanent way.

Dated 30th June.

1574. E. R. Handcock—Improvements in mechanism to decrease friction in propelling machinery, &c.
1575. A. E. L. Bellford—Construction of submarine tunnels. (A communication.)
1576. W. Rice—Harness, and in springs for same.
1577. J. Webb—Obtaining and applying motive power.
1578. G. Sterry—Producing designs in wood.
1579. A. P. How—Engine-meter for indicating number of strokes of an engine. (A communication.)

1580. E. Davies—Machinery for carding and cleaning cards.
1581. W. C. Spooner—Drills for agriculture.
1582. W. Tasker—Drills for agriculture.

Dated 1st July.

1583. R. Bradley and W. Craven—Moulding and compressing clay for bricks, tiles, &c.
1584. P. Hart—Manufacture of coke.
1586. G. Parsons—Machinery for thrashing, winnowing, and dressing corn.
1587. E. C. Shepard—Magneto-electric apparatus. (A communication.)

Dated 2nd July.

1588. J. and W. Rollinson—Preventing explosions.
1590. L. W. Wright—Machinery for pulverizing metalliferous quartz, &c.
1591. E. C. Shepard—Manufacture of gas.
1592. R. A. Brooman—Machinery for converting caoutchouc into circular blocks or cylinders, and manufacturing the same into sheets. (A communication.)
1593. R. A. Brooman—Impregnating threads, &c., with metal, called "metallic dyeing." (A communication.)

Dated 4th July.

1595. G. D. Fevre—Vessels for infusions, decoctions, &c.
1597. G. F. Parratt—Portable bridges.

Dated 5th July.

1598. H. Meyer—Looms for weaving.
1599. M. Davis—Improvements in carriages, scaffoldings, and ladders, which scaffoldings and ladders are used as carriages.
1600. D. J. Tripe—Locks.
1601. J. Fall—Treatment of oils.
1602. N. Pollard—Drawing wool and other staple.
1603. A. V. Newton—Machinery for printing. (A communication.)
1604. G. Mackay—Manufacture of glass. (A communication.)
1605. M. Poole—Quartz-crushing and amalgamating machine. (A communication.)
1606. G. A. Biddell—Apparatus for crushing grain, &c.

WEEKLY LIST OF PATENTS SEALED.

Sealed 15th July, 1853.

Year, 1853:

105. Edward Tasker, of South Hackney—Invention for the purposes of writing and drawing, called the "Writing and Drawing Tube."
107. James Hadden Young, of College-street, Camden Town—Improvements in brooms or brushing apparatus.
113. William Nairne, of South Inch Mill, Perth—Improvements in power-looms.
114. A. E. L. Bellford, of 16, Castle-street, Holborn—Improvements in the manufacture of "batting" or "wadding." (A communication.)
115. A. E. L. Bellford, of 16, Castle-street, Holborn—Improvements in the manufacture of blocks for printing music. (A communication.)
128. Robert Neale, of 49, Cumming-street, Pentonville—Improvements in the process of copper and other plate and cylinder printing and inking, and wiping and polishing by machinery the engraved plates and cylinders whilst used in the process.
136. Joseph Maudslay, of Lambeth—Improvements in steam-engines, which are also applicable, wholly or in part, to pumps and other motive machines.
225. William Archer, of Hampton Court—Invention of an improved mode or modes of preventing accidents by improved signals on railways, parts of which improvements are applicable to blast furnaces.
639. John Scott, junior, of Greenock—Improvements in the treatment or manufacture of animal charcoal.
713. John Beaumont, of Dalton, near Huddersfield—Invention of a new manufacture of certain descriptions of woven fabrics.
734. John George Truscott Campbell, of 13, Lambeth-hill, Upper Thames-street—Improvements in ships' propellers.
738. John Scott, junior, and George William Jaffrey, of Greenock—Improvements in steam-engines.
983. William Johnson, of 47, Lincoln's-inn Fields—Improvements in machinery for combing wool, or other fibrous materials. (A communication.)
1102. Charles Larbaud, of Paris, Rue du Temple, No. 134, Département de la Seine—Invention of a new system of trigger applied to play-arms, such as pistols, fusils, rifles, cannons, guns.
1121. Christopher Nickels, of York-road, Lambeth—Improvements in machinery for masticating, kneading, or grinding India-rubber, gutta-percha, and other matters.
1154. Samuel Russell, of Sheffield—Improvements in handles for razors.
1195. Moses Poole, of Avenue-road, Regent's-park—Invention of a new or improved machine for pegging boots or shoes.
1199. John O'Keefe, of 12, Queen Anne-street, Liverpool—Improvements in the manufacture of watch-cases.
1204. Robert Walter Swinburne, of South Shields—Improvements in apparatus or machinery to be used in the manufacture of glass.
1216. Joseph Webb, of Mayfield-terrace, Dalston—Improvements in rotatory engines.
1232. William Gossage, of Widnes—Improvements in the manufacture of alkali from common salt.
1238. Thomas Grahame, of Hatton Hall, Wellingborough—Improvements in the manufacture of covering materials for houses and other structures and surfaces.
1253. Edward Hammond Bentall, of Heybridge, Essex—Improved machinery or apparatus for measuring and indicating the power exerted by engines, and also the force required to propel machinery, carriages, or ploughs.
1257. Joseph Betteley, of Liverpool—Improvements in anchors.
1260. Amédée Devy, of 73, Grosvenor-street—Improvements in storing and preserving grain. (A communication.)
1272. John Henry Johnson, of 47, Lincoln's-inn Fields—Invention of an improved forge-hammer. (A communication.)

Sealed 16th July, 1853.

110. Thomas Potts and James Septimus Cockings, of Birmingham—Improvements in the manufacture of tubes, and in the application of tubes to certain purposes.

Sealed 18th July, 1853.

124. Orlando Reeves, of the Castle, Taunton—Improvements in the manufacture of manure.

Sealed 19th July, 1853.

239. William Constable, of the Photographic Institution, Brighton—Improvements in transmitting motive power to machinery, and in regulating the action of rotary machines.
397. Joseph and Alfred Ridsdale, of the Minories—Improvements in ships' side-lights, scuttles, or ports.
582. Nicholas Schmidt, of Goffontaine, near Sarrebruck, Prussia—Improvements in cleansing and separating ores and coal.
809. William Willcocks Sleigh, of London—Invention for the production of motive power, which he entitles the "Counteracting Reaction Motive-power Engine."
1140. Thomas Quaife, of Battle—Improvements in the manufacture of watches, watch cases, and in tools and apparatus employed therein.
1225. Charles Clarkson, of 9, Avery-row, Lower Grosvenor-street—Improved duster or dusting-brush, painting-brush, and all other description of brushes, the handle of which passes through the centre, and the hair or bristles are bound or tied round it.
1283. Samuel Sanderson Hall, of the Circus, Minories—Improvements in the means of preventing railway carriages running off the rails. (A communication.)
1285. William Edward Newton, of 66, Chancery-lane—Improvements in the generation of steam.
1287. William Haslett Mitchell, of Brooklyn, New York—Improvements in means for distributing and composing types.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietor's Name.	Address.
June 13	3487	Poultry Feeding Trough.	Barnard and Bishop	Norwich.
,, 14	3488	Improved Brace or Trousers-suspender.	Joseph James Welch and John Stewart Margetson	17, Cheapside.
,, 16	3489	Rake.	Warren Sharman	Melton Mowbray.
,, 18	3490	Improved Hydrostatic Flushing Pan Closet.	George Robert Macnalley, the elder, Page Whitchurch, and George Robt. Macnalley, the younger	63, Park-street, Camden Town.
,, 19	3491	Combined Case and Stand.	Thomas Cole	6, Castle-street, Holborn.